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ABSTRACT

Purposes of this report are to: (1) describe the extent of the childhood injury problem relative to diseases and other conditions affecting children in Maine who are 1 to 19 years of age; (2) give an overview of what is known about the incidence of childhood injuries in Maine; and (3) offer recommendations to improve the state's ability to control childhood injury. The primary causes of childhood injury deaths in Maine are accidents related to motor vehicles, fires, drowning, and suicide. The majority of childhood injury hospitalizations in the state are reimbursed by Blue Cross or commercial insurance, but about 20 percent are covered by public funds and another 10 to 15 percent are uninsured. A comprehensive approach to childhood injury control must be implemented if the state is to effectively reduce the threat of injuries to children. The approach should include data surveillance, public and professional education, and planned community intervention. (RH)

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CHILDHOOD INJURIES IN MAINE:

A STATUS REPORT

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THE PURPOSE OF THIS REPORT IS TO:

- DESCRIBE THE EXTENT OF THE CHILDHOOD INJURY PROBLEM RELATIVE TO DISEASES AND OTHER CONDITIONS AFFECTING MAINE CHILDREN.
- GIVE AN OVERVIEW OF WHAT IS KNOWN ABOUT THE INCIDENCE OF CHILDHOOD INJURIES IN MAINE.
- OFFER RECOMMENDATIONS TO IMPROVE MAINE'S ABILITY TO CONTROL CHILDHOOD INJURY.

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Additional copies of this report or of the detailed tables from which the data were derived may be obtained from the Department of Human Services, Division of Maternal and Child Health.

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January 1990

John R. McKernan, Jr.
Governor
State of Maine

Rollin Ives
Commissioner
Department of Human Services

"THE FACT THAT INJURIES ARE NOT OFTEN CONSIDERED AS A PUBLIC HEALTH PROBLEM IS ONE OF THE REASONS THAT THEY ARE A PUBLIC HEALTH PROBLEM."[1]

Dr. Leon Robertson

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EXECUTIVE SUMMARY

Injuries, both unintentional and intentional (self-inflicted or purposefully directed at another) are the leading cause of death to individuals aged 1 to 34 in Maine and nationally. This report is focused upon the status of childhood (ages 1-19) injury in Maine.

Injuries cause more childhood deaths than all other diseases combined. Deaths from injuries are only the tip of the iceberg; many more childhood injuries are treated in emergency rooms, physician's offices, and at home. Males are more likely to die from an injury than females. Injury is the leading cause of potential life lost and a leading cause of hospitalization for children.

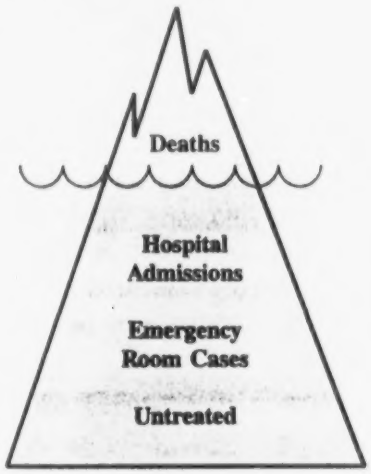
Injuries have been identified as one of the nation's most expensive public health problems. In Maine, the majority of childhood injury hospitalizations are reimbursed by Blue Cross or commercial insurance but approximately 20% rely on public funds and another 10-15% are uninsured.

Childhood injuries are both predictable and preventable. The recent National Research Council's report *Injury in America* identified injury as the principal public health problem in America. The primary causes of childhood injury deaths in Maine are motor vehicle related accidents, fires, drowning and suicide. Childhood injuries are influenced by the developmental stage of the child, by age, by geographical location, and by socioeconomic status.

The task of injury control is to limit the opportunity for injuries to occur and to minimize the consequences when they do occur. Additional intervention programs are necessary if we are to effectively reduce the threat of injuries to Maine children. A comprehensive approach to childhood injury control which includes data surveillance, public and professional education and planned community interventions must be implemented.

INJURIES ARE THE LEADING CAUSE OF DEATH FOR CHILDREN AGES 1-19, BOTH IN MAINE AND THE U.S. During childhood, injuries account for more deaths than the next nine leading causes of death combined. In 1986 alone, nearly 8,000 children died and 50,000 more were premanently disabled by unintentional injuries across the U.S.[2] In Maine, for the period from 1979 through 1987, there were 902 childhood (ages 1-19) injury deaths, or an average of 100 annually. This injury death rate declined to a rate of 69 Maine children annually during 1986-87. Adolescents (ages 15-19) are at the highest risk for injury deaths. In the nine year period, 83% of total Maine adolescent deaths were from injuries. Injury is responsible for more years of potential life lost among children than either heart disease or cancer, and represents significant costs in terms of dollars, pain, disfigurement, limitations in mobility and mental functioning. It has been estimated that preventing a single unnecessary injury death would save at least $2,000,000 in economic, medical and societal costs.[3]

DEATHS FROM INJURIES ARE ONLY THE TIP OF THE ICEBERG. A one year study of childhood injuries in Massachusetts revealed that for every injury death, 45 injuries required hospitalization, 1300 injuries were treated in emergency rooms and another 2600 injuries were treated at home.[4] Injury, particularly childhood injury, generally has been regarded as the result of an unavoidable accident or behavioral problem. **YET INJURIES ARE BOTH PREDICTABLE AND PREVENTABLE.** A great deal is known about how injuries happen and the types of injuries that children are most likely to experience.



The Injury Iceberg

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A 1985 REPORT, INJURY IN AMERICA,[5] IDENTIFIED INJURY AS THE PRINCIPAL PUBLIC HEALTH PROBLEM IN AMERICA. The report not only helped call national attention to this preventable health problem, but also recommended that a high priority be assigned to the development of national, state and local injury control programs. Since that time, the Federal Government has appropriated increasing levels of funding for injury control research and program interventions. As a result, knowledge of injury control strategies that can be successfully combined to prevent needless deaths and injuries has increased dramatically. By June 1987, ten states had established comprehensive injury control programs.[6]

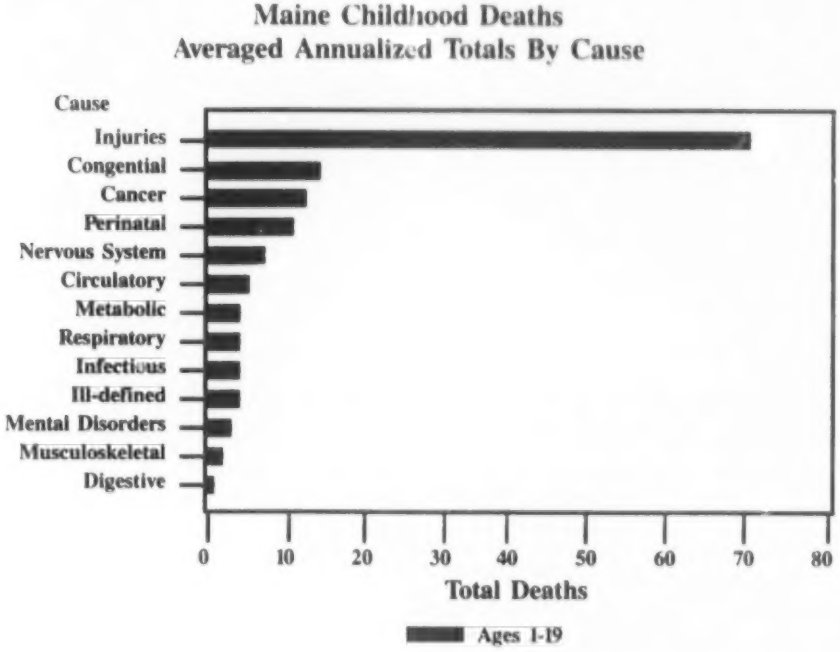
Due partly to the rural nature of the State and also to the scarcity of resources directed at controlling childhood injury, current activities in Maine are scattered and isolated. The Maine Bureau of Health, within the Department of Human Services, is responsible for promoting and protecting the public's health. **Key staff members from several divisions of the Bureau have organized to form an INJURY CONTROL TEAM to plan for the development of a comprehensive injury prevention and control program within the Bureau and to explore possible sources of funding.** At present, only limited injury prevention and control activities are supported through the Bureau. The Division of Maternal and Child Health supports injury control programs for children in the areas of poison control, child passenger safety promotion and child safety guidance offered to parents by community health nurses. The Division of Public Health Nursing provides child safety guidance through home visits and Well Child Clinics. The Division of Health Engineering serves as the liaison for consumer product safety information. In addition, numerous other public and private agencies play a role in the prevention and control of injuries. To date, the Bureau has conducted two public meetings to initiate closer working relationships among these groups.

The primary focus of this report is the current status of childhood injury in Maine for the two year period of 1986-87. Data for the two years have been totaled and averaged to produce annual totals. Reference is given to childhood injury deaths for the nine year period of 1979-87 in order to put the 1986-87 data in context.

Since less than 3% of deaths to Maine children under age one are from injuries, this age group has been excluded from the report.

FATALITIES

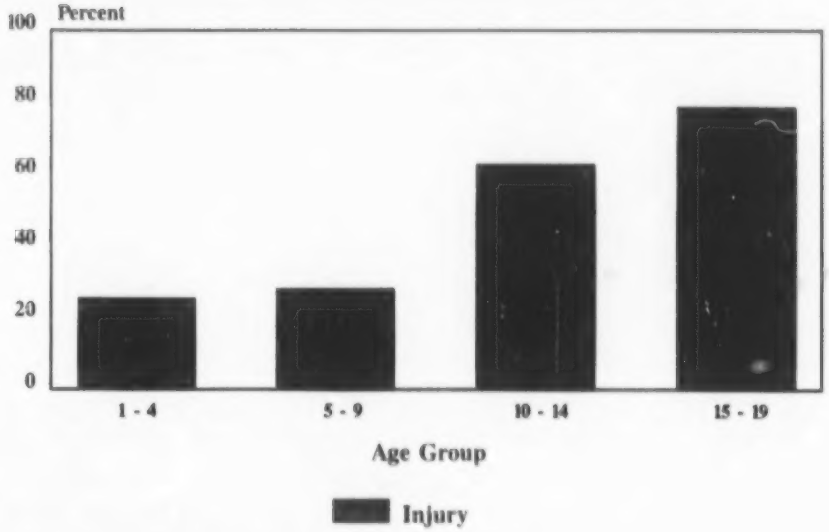
During 1986-1987, injury remained the leading cause of death for Maine youth aged 1-19 (Figure 1) accounting for 55% of total deaths.



Maine Vital Statistics 1986 - 1987 **FIGURE 1**

Injuries were responsible for 25% of the deaths of 1 to 4 year olds, 29% of the deaths of 5 to 9 year olds, 63% of the deaths of 10 to 14 year olds and 79% of the deaths of 15-19 year olds (Figure 2).

Percent of Maine Childhood Deaths Caused by Injury



Maine Vital Statistics 1986 - 1987 **FIGURE 2**

In general, New England childhood injury death rates are lower than national childhood injury death rates. Among the six New England states, Maine had the second highest rate of childhood deaths from injuries overall between 1979 - 1985. In that period, Maine had the highest child death rates of all New England states from pedestrian and burn injuries.

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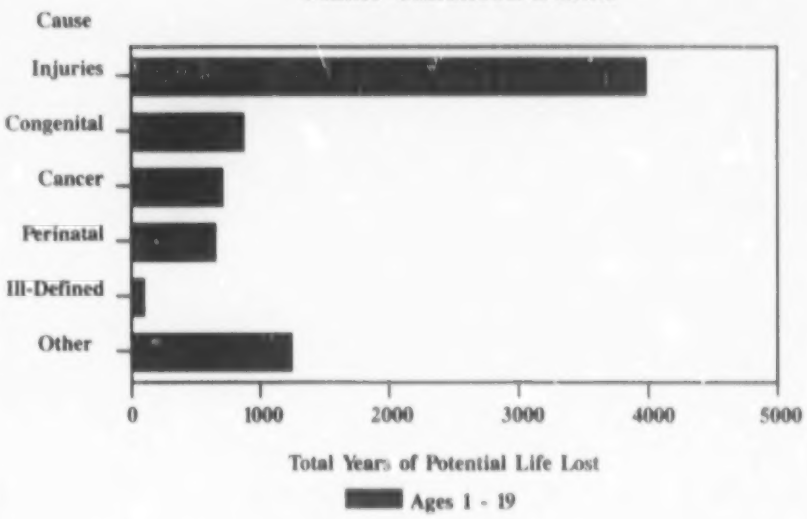
YEARS OF POTENTIAL LIFE LOST

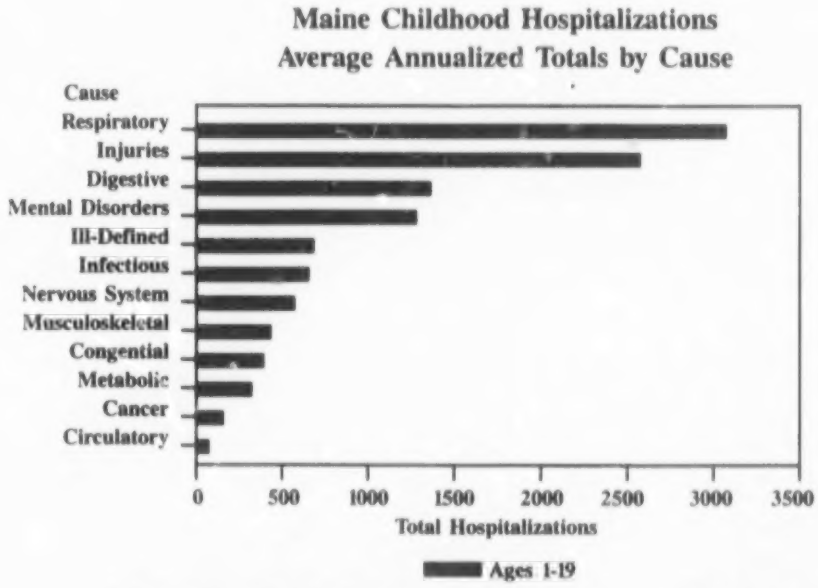
Injuries were the leading cause of years of potential life lost (YPLL) for ages 1-19 (Figure 3). YPLL is an indicator which is widely used in describing the impact of injury deaths. It measures the total annual years of life, before age 70, that would have remained had these individuals not died. Among children, injuries were responsible for 24 times as many YPLL as respiratory problems, and 6 times as many YPLL as cancer or perinatal problems.



Maine Vital Statistics 1986 - 1987 FIGURE 3

MORBIDITY

During 1986-1987 injury was the second leading cause of hospitalization for children ages 1-19 (Figure 4). An average of 2,619 children were hospitalized annually in this period.



Maine Hospital Data 1986 - 1987 FIGURE 4

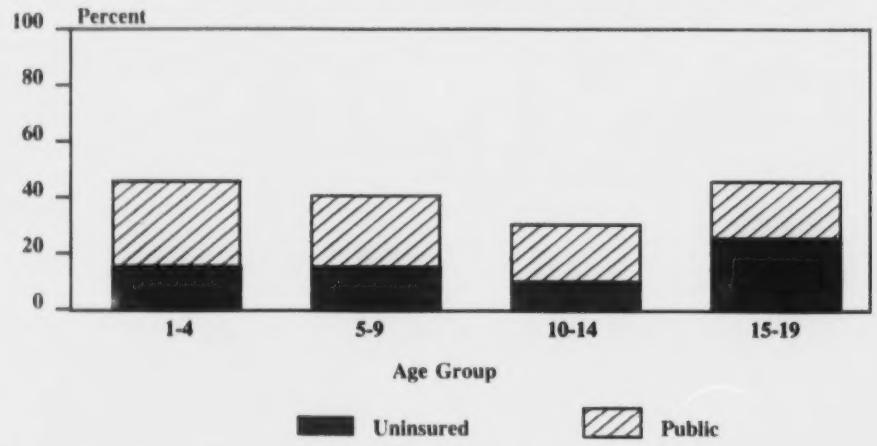
The chances of a child being hospitalized for an injury versus another disease increases with age. For ages 1-4, one of every six hospitalizations was due to injury compared to one of every five for children ages 5-9 and one of every four hospitalizations for children ages 10-19. For individuals over age 19, one of every nine hospitalizations was for an injury.

During the same two year period, injury was the second leading cause for utilization of hospital days for ages 1-19 accounting for an average of 11,452 hospital days annually. Childhood injury admissions averaged less than 5 days per admission. Of more importance than total hospitalizations, hospital days, and average length of stay, is the level of dysfunction when the child goes home. Unfortuantely, these data are not routinely available at present.

Twenty-one percent of the children hospitalized with an injury had some type of head injury, sometimes in combination with other injuries. Children experiencing a severe head injury frequently suffer a lifetime of dysfunction at great cost to families and society. Other types of injuries cause permanent limited mobility, disfigurement, and a variety of additional symptoms which forever restrict the child's potential.

The majority of childhood injury hospitalizations are reimbursed by Blue Cross or commercial insurance. However, approximately 20% of childhood injury hospitalizations are paid from public funds such as Medicaid, Title V, and workers' compensation. Dependence on public funds decreases with age and ranges from 30% for ages 1-4 to slightly more than 15% for ages 15-19 (Figure 5). Approximately 10% to 15% of injury-related hospitalizations are uninsured.

Maine Childhood Injury Hospitalizations
By Public or Uninsured Pay Source



Maine Hospital Data 1986 - 1987

FIGURE 5

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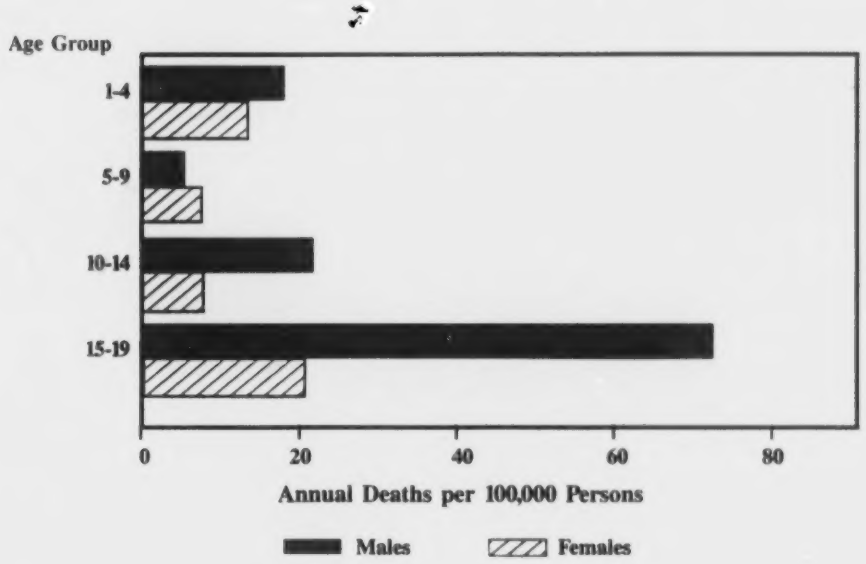
OVERALL INJURY RATES

Male children are more likely to die from an injury than females, particularly during the teenage years when there are three to four male injury deaths for every female injury death.

When considering injury death rates per 100,000 population, adolescent males (15-19) had the highest rate (72.7). Males aged 5-9 had the lowest rate (4.6) per 100,000 population (Figure 6).



Maine Vital Statistics 1986 - 1987 FIGURE 6

A similar pattern exists for hospitalizations except that males have higher rates across all age groups (Figure 7).

Childhood Injury Hospitalization Totals
Annualized by Sex per 100,000 Persons

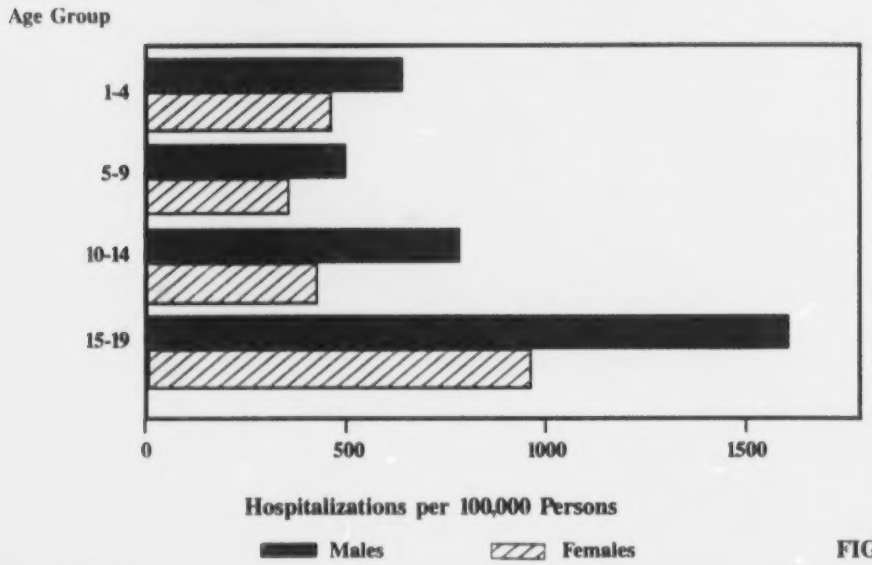


FIGURE 7

Maine Vital Statistics 1986-1987
Maine Hospital Data 1986-1987

CAUSE OF INJURY

Maine children are at especially high risk for injuries from motor vehicle related causes, fires, drowning and suicide. Motor vehicle related injuries, including motor vehicle occupant, pedestrian, motorcycle, bicycle or other means of transportation account for more than half of all child deaths. The major cause of fatal childhood injuries varies somewhat by age group. On average, in the nine year period from 1979 through 1987, the leading causes of death by age group were:

Ages 1-9	Ages 10-14	Ages 15-19
Fires/Burns	Motor-vehicle related	Motor-vehicle related
Motor-vehicle related	Drowning	Suicide
Drowning	Suicide	Drowning

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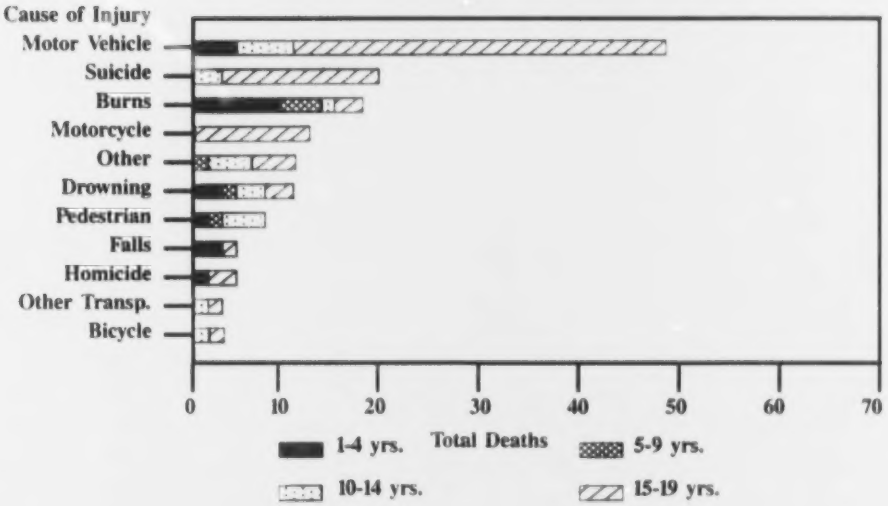
The leading causes of injury deaths to children during 1986-1987 are illustrated below (Figure 8).

Maine Childhood Injury Deaths by Age
Annualized Total by Cause of Injury



Maine Vital Statistics 1986 - 1987 **FIGURE 8**

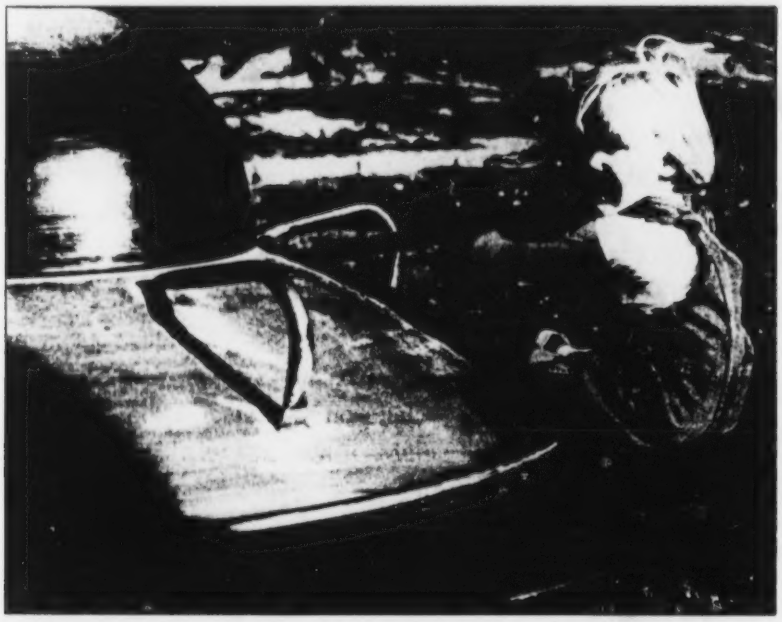
MAINE NEEDS IMPROVED DATA TO KNOW WHO IS INJURED AND HOW INJURIES OCCUR SO THAT INJURY CONTROL PROGRAMS CAN BE TRAGETED TO THE POPULATIONS AT RISK. While it is possible to determine the nature of an injury (e.g. fracture) from medical records, only 40% of Maine hospitalization records document the cause of injury (e.g. fall from bicycle). Cause of injury data are required when a child dies. However, documentation of the cause of injury for non-fatal injuries is not required in Maine.

Without increased utilization of E-codes*, the coding system which denotes the cause of injury, Maine has limited ability to describe how non-fatal injuries occur.

* See glossary for complete definition.

DISCUSSION

Maine injury data indicate that childhood mortality and morbidity vary by developmental stage, by age, by geographical location, and by socio-economic status. Intervention programs which match the pattern of childhood injuries must be implemented if the toll of injuries to this otherwise healthy population is to be reduced.



CHILDHOOD INJURIES ARE STRONGLY INFLUENCED BY THE DEVELOPMENTAL STAGE AND BEHAVORIAL CHARACTERISTICS OF THE CHILD. Young children often do not recognize situations that put them at risk. Parents and other caretakers sometimes are not aware that children may misjudge a dangerous situation. These factors contribute to the increased incidence of injuries among the young.

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Education to increase public awareness of injury prevention methods can help reduce this major child health risk. Adults can ensure that children under 10 are protected from safety hazards in the home, taught bicycling safety, provided controlled access to water recreation, and restrained in motor vehicles. The child over ten needs clear information about the consequences of risk-taking behavior and close adult supervision to limit such behavior. Excessively careless or risk-taking behaviors among youths should provide a clue to the need for increased support/guidance to prevent self-destructive behavior.

Adolescence is a time of rapid physical and psychosocial development often characterized by an increase in risk taking behaviors. At the same time, teens expect and need to have increased freedom. While gaining independence is essential to reaching maturity, adult supervision continues to be necessary to the growing young person. Young drivers need a period of supervised driving experience after Driver Education and before applying for a license. Regular use of seat belts, helmets and other protective measures require parent/guardian involvement and enforcement. Drinking while driving can be diminished by organizing chemical free events, designated driver programs and by tailoring educational information to the adolescent. Raising the drinking age and enforcing drinking/driving laws have been shown to reduce the death rate among young people.

CHILDHOOD INJURIES VARY BY GEOGRAPHICAL LOCATION. Rural highways produce more severe traumas. Factors such as speed, proximity of roadside obstructions and road conditions all play a role. Falls from buildings are more often a problem for young children in urban areas than in rural areas. The location of play areas, neighborhood traffic patterns and availability of safe areas for pedestrians and bicyclists all influence the likelihood of childhood injuries. Thus geographical location needs to be considered when determining priorities for intervention.

CHILDHOOD INJURIES VARY BY SOCIOECONOMIC STATUS. An important finding of the Maine Child Death Study (1976-1980) was that children from families of lower socioeconomic status are at greater risk of dying than other children.[7] Initial findings of a subsequent research project, the Maine Childhood Mortality Prevention Program Interview and Records Study, 1985-1986, reveal that health-risk behaviors were more common among parents in families where a child death had occurred than in control families.[8] Further analysis of these data could prove useful for understanding ways to prevent injuries among children at highest risk.

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THE TASK OF INJURY CONTROL IS TO LIMIT THE OPPORTUNITY FOR INJURIES TO OCCUR AND TO MINIMIZE THE CONSEQUENCES WHEN THEY DO OCCUR. Injury control analysis identifies those injuries which can be reduced and the cost effective, socially acceptable strategies which will reduce them. A multi-disciplinary approach to reducing the incidence of injuries is necessary. The most successful approaches to reducing injuries from any cause have involved a combination of strategies: promoting behavioral change through education, legislative initiatives, the application of new technology and the enforcement of regulations.

An injury actually consists of three phases . . . before, during and after the event. For example, motor vehicle crashes are a major cause of childhood injury. Car seats provide protection for young children during a crash. Legal mandates and education for correct use of car seats and seat belts are key pre-event activities. This act of prevention makes a motor vehicle crash more survivable and eliminates or minimizes the need for medical care after the event.

Childhood injury control is different from adult injury control in several key aspects: the child is presumed to be unaware of the true risk; another person (i.e., parent, teacher, coach, babysitter) is usually responsible for supervising the child; and the physical and intellectual capabilities of the child are changing. Many activities directed generally at society will benefit youth, but child specific planning and interventions must occur if injuries to this population are to be significantly reduced.

RECOMMENDATIONS

Each year, thousands of Maine children are injured, resulting too often in permanent disability or death. Barriers to conducting injury prevention efforts in Maine include gaps in data, lack of coordination of injury control activities, lack of awareness of the magnitude of the problem and lack of resources to document the problem and to institute intervention programs. The following recommendations offer a comprehensive approach to improving childhood injury control in the State of Maine.

IMPROVE DOCUMENTATION OF THE CAUSE OF INJURY.

DEVELOP A DATA SURVEILLANCE SYSTEM UTILIZING MORBIDITY AND MORTALITY DATA WHICH PROVIDES ONGOING DOCUMENTATION OF INJURIES FOR PROGRAM PLANNING AND EVALUATION PURPOSES.

INCREASE AWARENESS OF CHILDHOOD INJURY AND MEANS OF PREVENTION THROUGH TARGETED PUBLIC EDUCATION ACTIVITIES.

INCREASE COORDINATION OF EFFORTS BY ESTABLISHING NETWORKS WITH PROFESSIONAL, STATE, AND LOCAL AGENCIES WITH AN INTEREST IN PROMOTING CHILD SAFETY.

EXPAND CAPACITY OF STATE HEALTH AGENCY TO ACT AS A TECHNICAL RESOURCE TO HEALTH, EDUCATION AND SAFETY PROFESSIONALS, LEGISLATORS AND POLICY MAKERS.

INCREASE THE ALLOCATION OF RESOURCES DEDICATED TO CHILDHOOD INJURY PREVENTION AND CONTROL.

IMPROVE DOCUMENTATION OF THE CAUSE OF INJURY

Acceptable methods to improve documentation of the cause of injury in Maine medical records must be explored and encouraged. Utilization of E-codes in case of non-fatal injuries must be increased. Training events targeted at specific groups, such as physicians, pediatric nurses, law enforcement agents, and medical records personnel need to be designed and delivered so that all appreciate the need for complete documentation of injury occurrence.

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DEVELOP A DATA SURVEILLANCE SYSTEM UTILIZING MORBIDITY AND MORTALITY DATA WHICH PROVIDES ONGOING DOCUMENTATION OF INJURIES FOR PROGRAM PLANNING AND EVALUATION PURPOSES.

The occurrence of injuries varies among age groups, in different geographic areas, and by socioeconomic status. Ongoing surveillance data are needed to help predict who is at risk, and under what circumstances injuries occur. These data can help to set priorities for establishing intervention programs and to evaluate the effectiveness of injury control measures which are implemented.

As of June 1987, twenty-two states had developed an injury surveillance system.[9] The Maine Emergency Medical Services Office monitors injuries which require ambulance transport by linking population, ambulance run reports, motor vehicle crash reports, hospital discharge and mortality data. The Injury Control Team is currently exploring expansion of the EMS system to include additional data from readily available data sources. Funding will be sought to support expansion of this system and an in-depth analysis of data from the 1985-6 Childhood Mortality Prevention Program Interview and Records Study.

INCREASE AWARENESS OF CHILDHOOD INJURY AND MEANS OF PREVENTION THROUGH TARGETED PUBLIC EDUCATION ACTIVITIES

National surveys have indicated that parents lack awareness of common injury risks faced by their children. A 1987 survey revealed that the majority of parents do not realize the severity of the threat to child health posed by injuries.[10] This survey also indicated that parents want more child safety information and instruction on responding to medical emergencies. The Childhood Injury Control Program provides printed educational materials suitable for distribution to parents on poisoning prevention and child passenger safety. Partial funding for these materials has been provided by the Bureau of Safety in the Department of Public Safety. However, there is a growing demand for additional handout materials and audiovisual aids to help promote child safety. Mass media resources must also be utilized to promote timely injury prevention messages. Public education efforts of organizations like the Maine Coalition for Safe Kids and others should be supported and encouraged throughout the State.

INCREASE COORDINATION OF EFFORTS BY ESTABLISHING NETWORKS WITH PROFESSIONAL AND OTHER STATE AND LOCAL AGENCIES WITH AN INTEREST IN PROMOTING CHILD SAFETY

New coalitions of state and local agencies from health, safety, education, social services, mental health and consumer protection need to be brought together to address the commmon goal of reducing childhood injuries. Increased involvement of the EMS Office, the Bureau of Rehabilitation and other State Departments should provide a foundation from which to build a comprehensive statewide program. Interventions must be implemented at the community level based on local needs with guidance provided through the state program. Partnerships between the Childhood Injury Control Program, other state programs, private sector practitioners and the Maine Coalition for Safe Kids offer the promise of an effective campaign to reduce the most serious health problem threatening Maine children today.

EXPAND CAPACITY OF STATE HEALTH AGENCY TO ACT AS A TECHNICAL RESOURCE TO HEALTH, EDUCATION AND SAFETY PROFESSIONALS, LEGISLATORS AND POLICY MAKERS.

In order to effectively translate injury prevention methods into action in Maine, the capacity to provide program guidance, training and technical assistance to state government agencies, professionals and local communities must be expanded.

The Childhood Injury Control Program has provided a limited number of injury control training events for public health nurses, day care operators, educators, safety professionals, health and human service professionals. Plans to develop specialized training for child welfare workers, athletic coaches and other professionals who work directly with high risk families are presently being formulated.

Information on the feasibility and cost-effectiveness of implementing injury control measures in Maine needs to be compiled and disseminated to policymakers and legislators. The Childhood Injury Control Program also needs to build its capacity to monitor legislation relevant to injury prevention and to provide timely data on childhood deaths and disabilities from injuries to back up legislative and administrative decision making.

INCREASE THE ALLOCATION OF RESOURCES DEDICATED TO CHILDHOOD INJURY PREVENTION AND CONTROL

Less than 1% of the Maternal and Child Health Federal Block Grant is currently allocated to the prevention of childhood injuries. As a result, little staff time is devoted to promoting child safety statewide and resources to assist local communities in addressing priority injury prevention issues are limited. Additonal allocations of state, federal and local dollars are necessary. With increased collaboration between the state program and Maine communities and armed with more detailed knowledge of the factors surrounding childhood injury, local groups may be able to secure private sector funds for special community based projects.

Without additional resources dedicated to reducing the leading cause of child death and disability, future progress will be limited.

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APPENDIX

Maine Vital Statistics: Mortality data recorded on the death certificate were obtained from the Maine Department of Human Services and include all deaths for Maine residents who died in the state during 1986 and 1987.

Death certificate data include both a medical cause of death and the E-coded cause of injury (fall, motor vehicle, etc.). Both are coded according to the International Classification of Diseases Ninth Revision Clinical Modification (ICD-9-CM). ICD-9-CM codes were used to code the medical cause of death and E-codes the external cause of death. Injuries were defined as codes within the range of 800-999. Dat for the two years 1986-1987 were totaled and averaged to produce annualized totals for analysis.

Maine Hospital data were obtained from the statewide uniform hospital discharge data set. All Maine hospitals must file this data with the Maine Health Care Finance Commission on a quarterly basis. This information is merged and edited to produce a statewide data summary. Disease groupings were categorized according to the principal diagnosis listed for each case. Injury was defined according to the ICD-9-CM codes 800-999.

Maine had an annualized hospitalization rate of about 165,000 persons per year including newborns during 1986-1987. The following were excluded from the analysis.

1. Transfers to other acute care hospitals.
2. Non-Maine residents admitted to Maine hospitals.
3. Deaths.
4. Mothers and newborns.
5. Discharges with a V-code as a principal diagnosis.

The above cases were excluded primarily to avoid double counting and inclusion of irrelevant cases which would mask relevant variances. Injury cases with either a principal diagnosis of late effects of care (ICD-9-CM 905-909) or complications of care (ICD-9-CM 996-999) were not excluded.

Population Data: Estimates of the 1986 and 1987 Maine population prepared by the Maine Department of Human Services were used to calculate age and sex-specific rates per 100,000 persons. Rates were annualized by totaling data for 1986 and 1987 and dividing by two.

GLOSSARY

Mortality	Mortality refers to deaths.
Morbidity	Morbidity refers to non-fatal conditions requiring medical attention.
Intentional Injury	Intentional injuries include suicide, homicide, assault, child abuse, etc.
Unintentional Injury	Unintentional injuries include all accidental injuries.
E-codes	Code (International Classification of Diseases, Ninth Revision, Clinical Modification) assigned to indicate the cause of an injury such as a fall from stairs, bicycle collision with an automobile, etc.